Technical Session III

Indian Data Centers for the 21st Century

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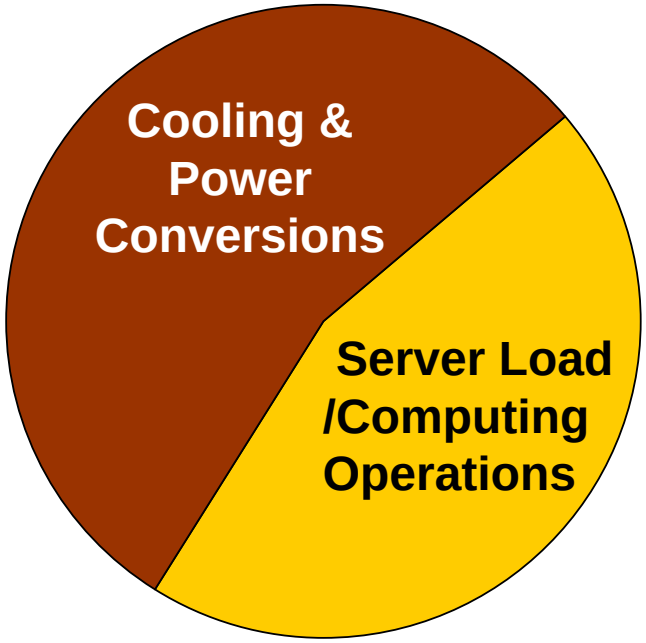
Dale Sartor
Lawrence Berkeley National Laboratory
DASartor@lbl.gov

BERKELEY LAB

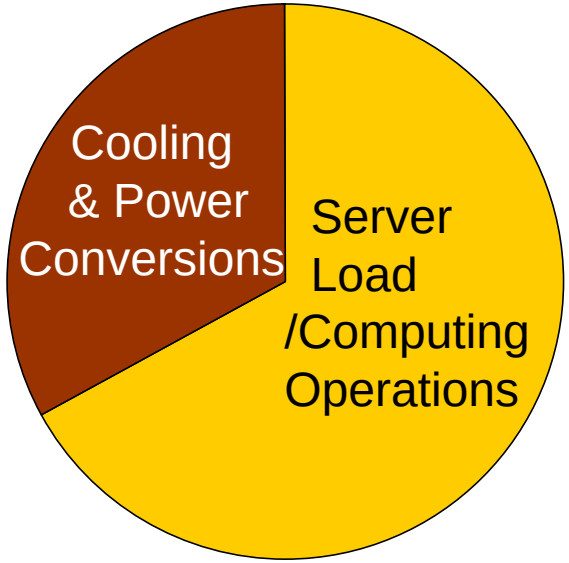
Topics:

- Summary of Workshop
- Resources

IT Equipment Efficiency, Data Center Cooling and Power Conversion Performance Varies



Typical Practice

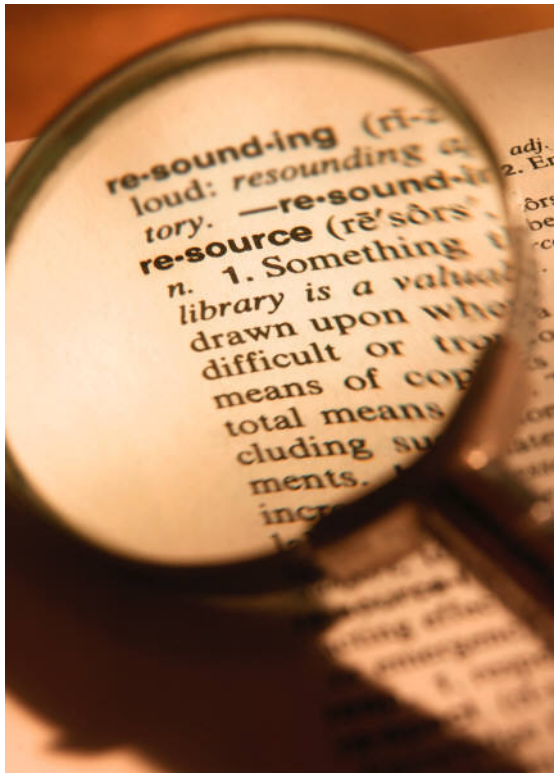


Better Practice

Summary of Opportunities for Energy Efficiency:

- IT equipment optimization
- Air management
- Right-sizing
- Central plant optimization
- Efficient air handling
- Free cooling
- Humidity control
- Power chain incl. UPSs and power supplies
- On-site generation
- Liquid cooling
- Design and M&O processes

Resources: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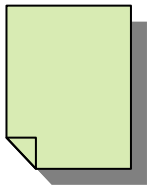
Web-based Resource:

http://hightech.lbl.gov/datacenters.html

Good starting point for those seeking efficiency measures

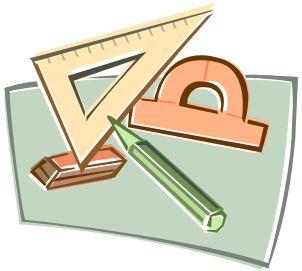


Best Practices

Self-benchmarking Guide

Benchmark data

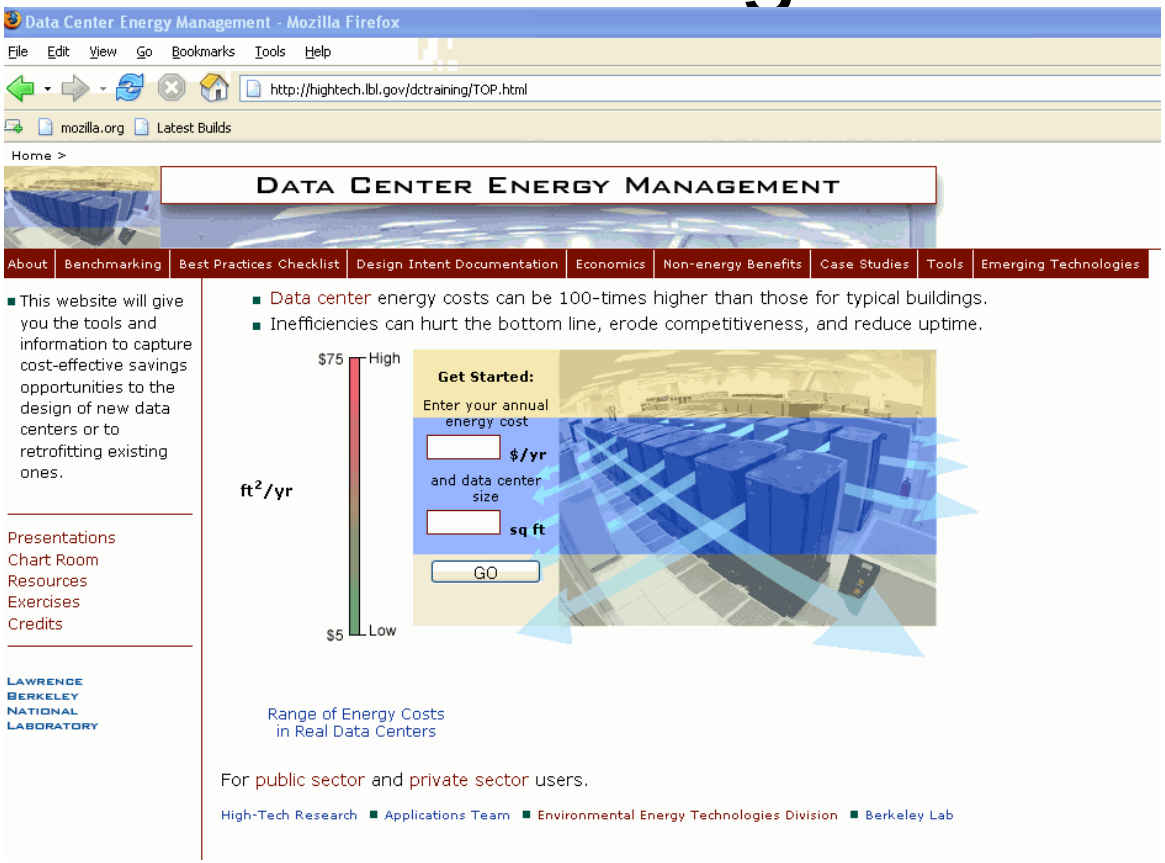
Case Studies



Design Guidance

Other Reports (demonstrations)

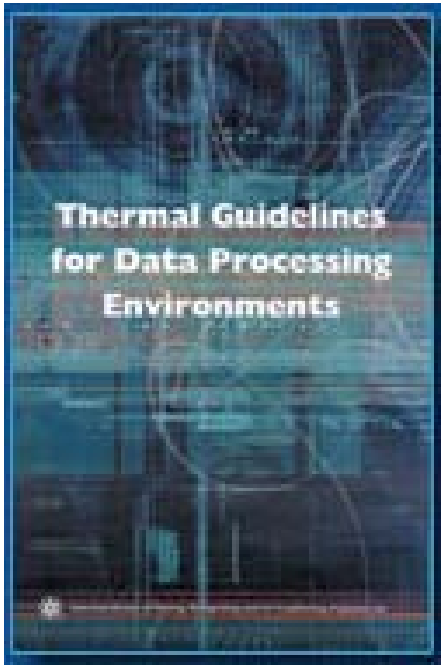
Design Guidance is Summarized in a Web Based Training Resource:

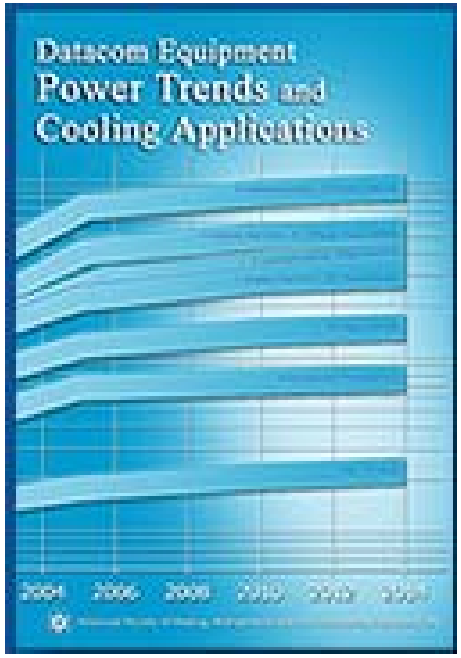


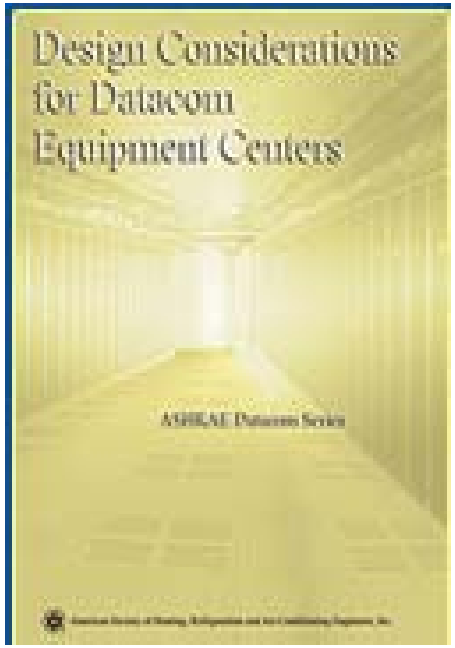
http://hightech.lbl.gov/dctraining/TOP.html

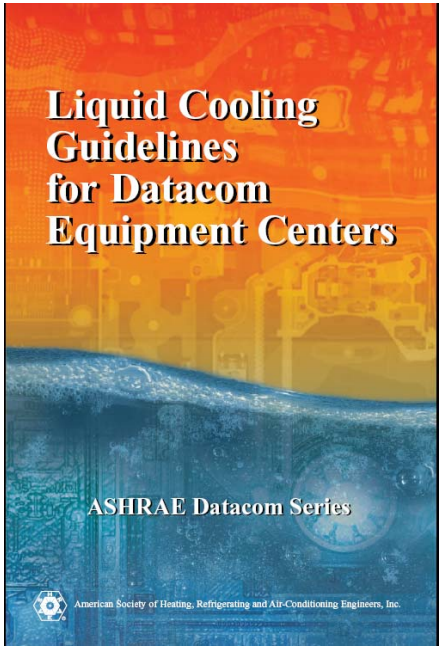
ASHRAE Resources

Four books published—
more in preparation









ASHRAE, Thermal Guidelines for Data Processing Environments, 2004, Datacom Equipment Power Trends and Cooling Applications, 2005, Design Considerations for Datacom Equipment Centers, 2005, Liquid Cooling Guidelines for Datacom Equipment Centers, 2006, © American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., www.ashrae.org

Order from http://tc99.ashraetcs.org/

- ASHRAE (http:\\www.ashrae.org)
  - Technical Committee (TC) 9.9 Mission Critical Facilities http://tc99.ashraetcs.org/
  - Design Considerations for Datacom Equipment Centers
  - Datacom Equipment Power Trends and Cooling Applications
  - Thermal Guidelines for Data Processing Environments
  - Additional Guidelines in Development
    - TCO and Energy Efficiency
    - High Density Data Centers
    - Liquid Cooling
    - Filtration
    - Structural

Other Resources

- PG&E CoolTools™ Chilled Water Plant Design Guide (http://taylor-engineering.com/publications/design_guides.shtml)
- LBNL High Performance Datacenters, A Design Guidelines Sourcebook (http://hightech.lbl.gov/documents/DATA_CENTERS/06_DataCenters-PGE.pdf)
- Uptime Institute (http://www.upsite.com/TUIpages/tuihome.html)
- Green Grid (http://www.thegreengrid.org/home)
- DOE Website: Sign up to stay up to date on new developments (www.eere.energy.gov/datacenters)
- EPA/Energy Star (http://www.energystar.gov/index.cfm?c=prod_development.server_efficiency)

Sponsors and Stakeholders

- Sponsors:
  - California Energy Commission (CEC)

http://www.energy.ca.gov/pier/

  - U.S. Department of Energy (DOE)

http://www1.eere.energy.gov/industry/saveenergynow/partnering_data_centers.html

  - U.S. Environmental Protection Agency

http://www.energystar.gov/datacenters

  - Pacific Gas and Electric Company (PG&E)

http://www.pge.com/docs/pdfs/biz/rebates/hightech/06_DataCenters-PGE.pdf

- Stakeholders:
  - Industry Organizations

    e.g., Green Grid, ASHRAE, AFCOM, 7x24, SVLG
  - Equipment suppliers
  - Research organizations
  - Consultants

Contact Information:

Dale Sartor, P.E.
Lawrence Berkeley National Laboratory
Applications Team
MS 90-3011
University of California
Berkeley, CA 94720

DASartor@LBL.gov
(510) 486-5988
http://Ateam.LBL.gov